

Plan Review Checklist for 1&2 Family Residential  
Basement Conversion to Habitable Space  
8th edition, Massachusetts State Building Code



Property Address: \_\_\_\_\_

Review by: \_\_\_\_\_

Review Date Started: \_\_\_\_\_ Completed Review Date \_\_\_\_\_

E-Mail Address: \_\_\_\_\_

**PROCEDURE FOR OBTAINING A BUILDING PERMIT FOR 1 OR 2 FAMILY ( Basement Conversion to Habitable Space )**

**GENERAL SUBMISSION INFORMATION:**

- 1. Massachusetts State Building Code, 780 CMR 8th Edition,**
- 2. Application form page 1**
  - o Property Address
  - o Zoning District
  - o Building Setbacks
  - o Water Supply, Flood Zone Information, Sewage Disposal Information
  - o Property Ownership / Authorized Agent
  - o Authorized Agent
- 3. Complete page 2 and 3 of application form**
- 4. Plot Plan §R106.2 (separate from building plans) required for additions and accessory buildings to include;**
  - o This plan shall be prepared by an Engineer or Registered Land Surveyor in accordance with the Massachusetts Registration Laws, and submitted to the Inspector of Buildings prior to framing
  - o Location of existing and proposed construction with dimensioned setbacks
  - o Location of lot lines, dimensions of lot & frontage
  - o Property address: map & lot number, zoning district & overlays
  - o Statement that existing condition does / does not lie within a Flood Hazard Zone as shown on the F.E.M.A map of the Town of Grafton
  - o Septic System location with reserve area
  - o Well location if applicable
  - o Wetland delineation if applicable
  - o North Arrow
  - o Drawing scale
  - o Date of Document
  - o Location & dimensions of public easements, public utility easements, railroad right-of-ways, and established zoning setback requirements.
  - o Location & dimensions of primary & accessory buildings & structure also street access drives and walks or other conditions rendering the land surface impervious
  - o §R403.1.7.2 Foundation Clearance from Slopes

**The Plan Submitted to Have**

- Original Seal (wet seal)
- Original signature
- A copy electronically submitted in PDF or Auto Cad Format

**5. Completed Energy Conservation Application Form**

- Slab-on-Grade Insulation

# 2012 International Energy Conservation Code

## SECTION R402 BUILDING THERMAL ENVELOPE

### R402.1 General (Prescriptive).

The *building thermal envelope* shall meet the requirements of Sections R402.1.1 through R402.1.4.

#### R402.1.1 Insulation and fenestration criteria.

The *building thermal envelope* shall meet the requirements of Table R402.1.1 based on the climate zone specified in Chapter 3.

TABLE R402.1.1 INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT<sup>a</sup>

CLIMATE ZONE	FENESTRATION U-FACTOR <sup>b</sup>	SKYLIGHT <sup>b</sup> U-FACTOR	GLAZED FENESTRATION SHGC <sup>b, e</sup>	CEILING R-VALUE	WOOD FRAME WALL R-VALUE <sup>j</sup>	MASS WALL R-VALUE <sup>i</sup>	FLOOR R-VALUE	BASEMENT <sup>c</sup> WALL R-VALUE	SLAB <sup>d</sup> R-VALUE & DEPTH	CRAWL SPACE <sup>c</sup> WALL R-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 <sup>h</sup>	8/13	19	5/13 <sup>f</sup>	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5 <sup>h</sup>	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 <sup>h</sup>	13/17	30 <sup>g</sup>	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10 <sup>h</sup>	15/20	30 <sup>g</sup>	15/19	10, 4 ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 <sup>h</sup>	19/21	38 <sup>g</sup>	15/19	10, 4 ft	15/19F

c. "15/19" means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall.

"15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home.



**example of 15/19 utilizing R-5 continuos insulation**

**6."'" Three sets of plans and specifications showing the proposed work**

**7• Construction Drawings**

**Cover Sheet**

- o Address with Assessor Map and Parcel
- o Date of latest revision
- o Tabulated Square Foot Area of all proposed renovation (and spaces if applicable)

**8. Construction documents (¼" scale minimum)**

- o Floor Plan area of work is being performed
- o Building dimensions Space designation – (ie: living room, kitchen, bedroom, storage, etc.)
- o Demonstrate light and ventilation compliance §R303.1
- o Door and window location per schedule on cover sheet, identifying egress windows and safety glazing
- o ~~Show attic access size and location~~
- o Location and type of smoke detectors and carbon monoxide detectors
- o Emergency escape and rescue required. Basements, habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening

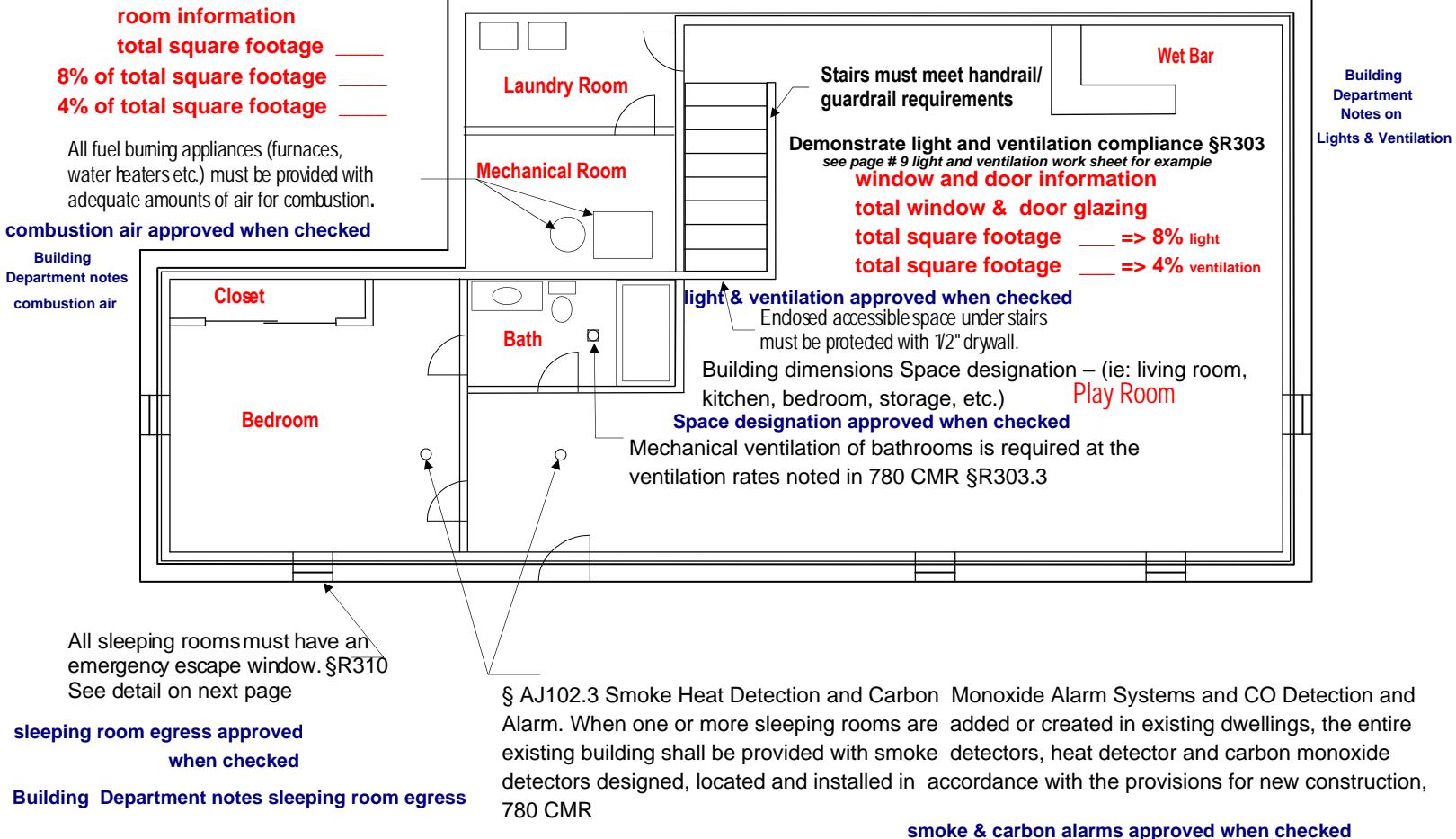
**\*\*\*\*\*; 0\*\*\*\*\*Framing plan**

- o Conventional framing plan all levels including roof, showing size, spacing and direction of structural members
- o Conventional header and beam sizes, spans and bearing clearly showing load path to foundation (ie: doorways, windows, archways, overhead doors, covered porches and decks and structural ridges)
- o Engineered floor framing and roof truss plans stamped by a professional registered engineer in the Commonwealth of Massachusetts.
- o Engineered manufactured beams and columns stamped by a registered professional engineer in the Commonwealth of Massachusetts. Calculations shall be site specific verifying they generated the loads indicated and that the input and output data provided is site specific to include verification of load path and column adequacy to foundation...disclaimers of any kind shall be rejected.
- o Provide stamped engineered analysis for bearing stud wall height greater than 10 feet, and for non-load bearing stud walls in excess of heights listed in Table §R602.3(5).

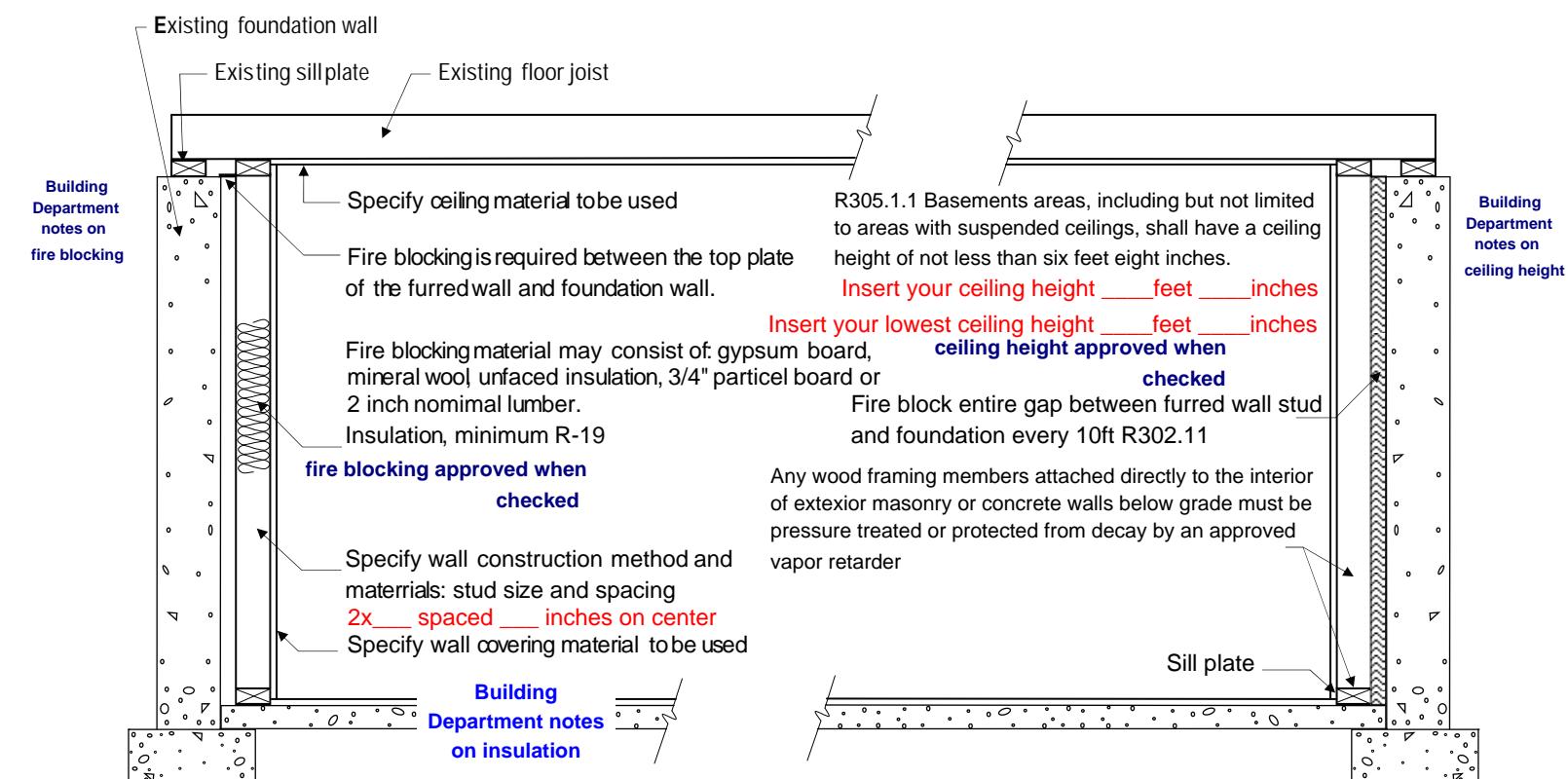
**10. Mechanical Review**

- O Heating system location, size (BTU), location of fuel source and method of combustion air make-up
- O Solid fuel burning appliance location, size, installation manual and method of combustion air make-up
- O Location of duct work if installed in exterior wall, the Energy Conservation Application Form noted above must reflect decreased R- value or indicate method of maintaining exterior wall integrity
- O Proposed work (If utilizing existing equipment, you MUST submit a heat loss calculation showing existing loads and also proposed new loads)

# Typical Basement Conversion to Habitable Space



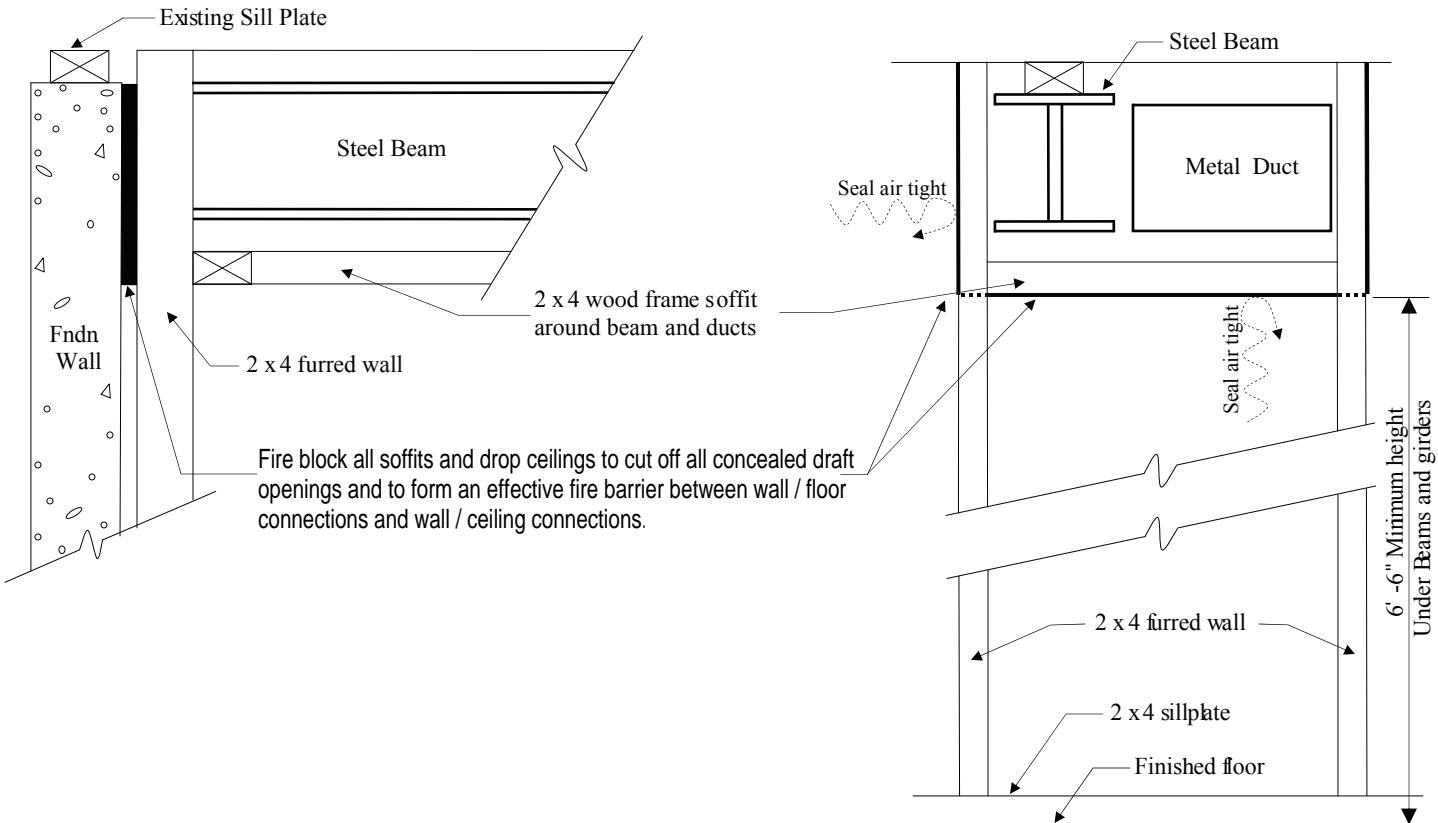
## FLOOR PLAN FOR BASEMENT FINISH



## TYPICAL WALL SECTION

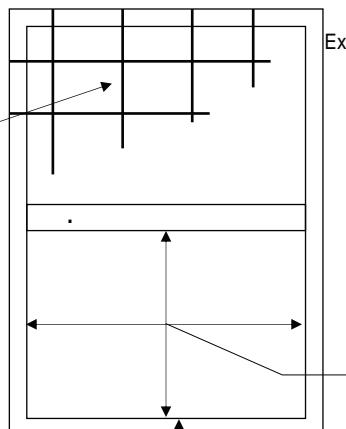
**insulation approved when checked**

Building Department Notes on  
 Lights & Ventilation



### SOFFIT FIRESTOPPING DETAIL

Bars, grilles, covers, screens or similar devices are permitted to be placed over emergency escape opening or window wells provided they meet the minimum net clear opening requirements and such devices are releasable or removable from the inside without the use of a key, tool, special knowledge or force greater than that which is required for normal operation of the escape and rescue opening.



§ R310 Minimum Opening Area.  
All emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet.  
Exceptions:  
1. Grade floor openings shall have a minimum net clear opening of five square feet (0.465 m<sup>2</sup>).  
2. Double hung windows used for emergency escape shall be permitted to have a net clear opening of 3.3 square feet (0.31 m<sup>2</sup>) provided that at least one operable sash meets the minimum height and width required by 780 CMR § R310.1.2 and § R310.1.3 and operational constraints defined by 780 CMR § R310.1.4.

**means of egress approved when checked**

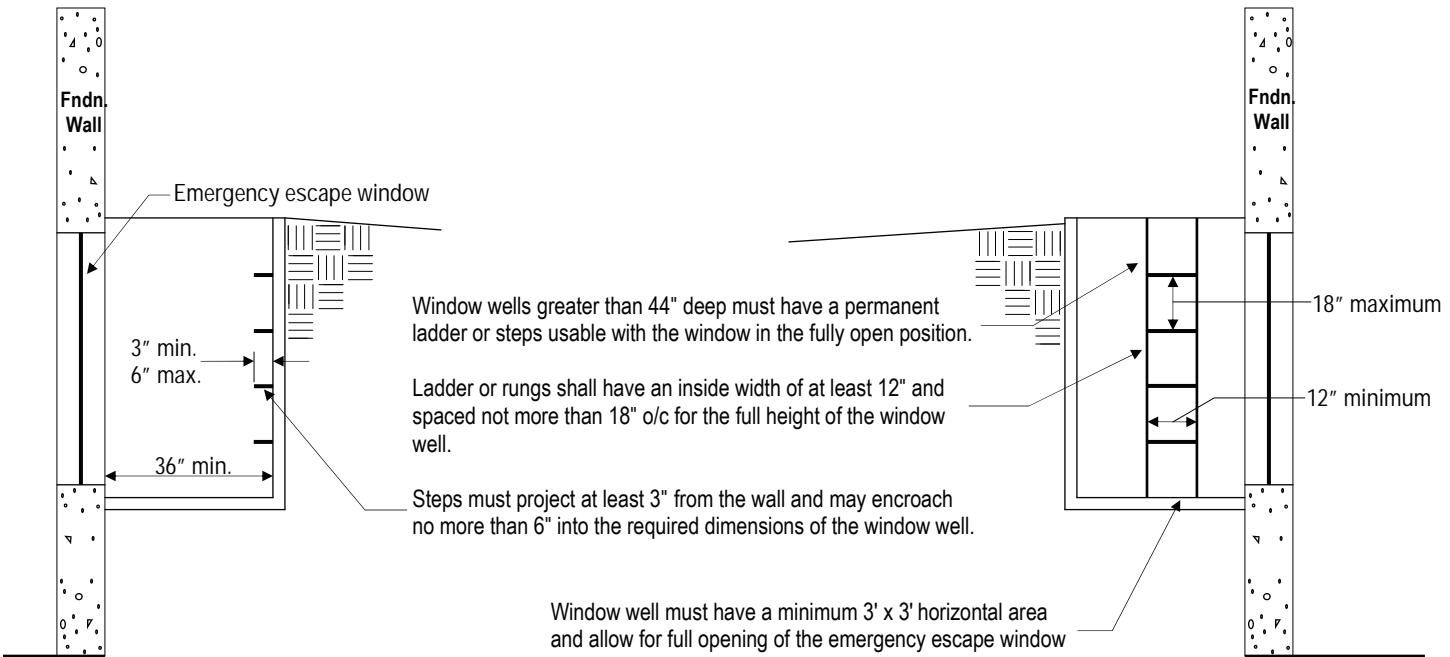
**44"" Max. sill height for egress (bedroom) \_\_\_\_" (insert your sill height)**

### **EMERGENCY ESCAPE WINDOW DETAIL**

windows measured from floor to top of sill

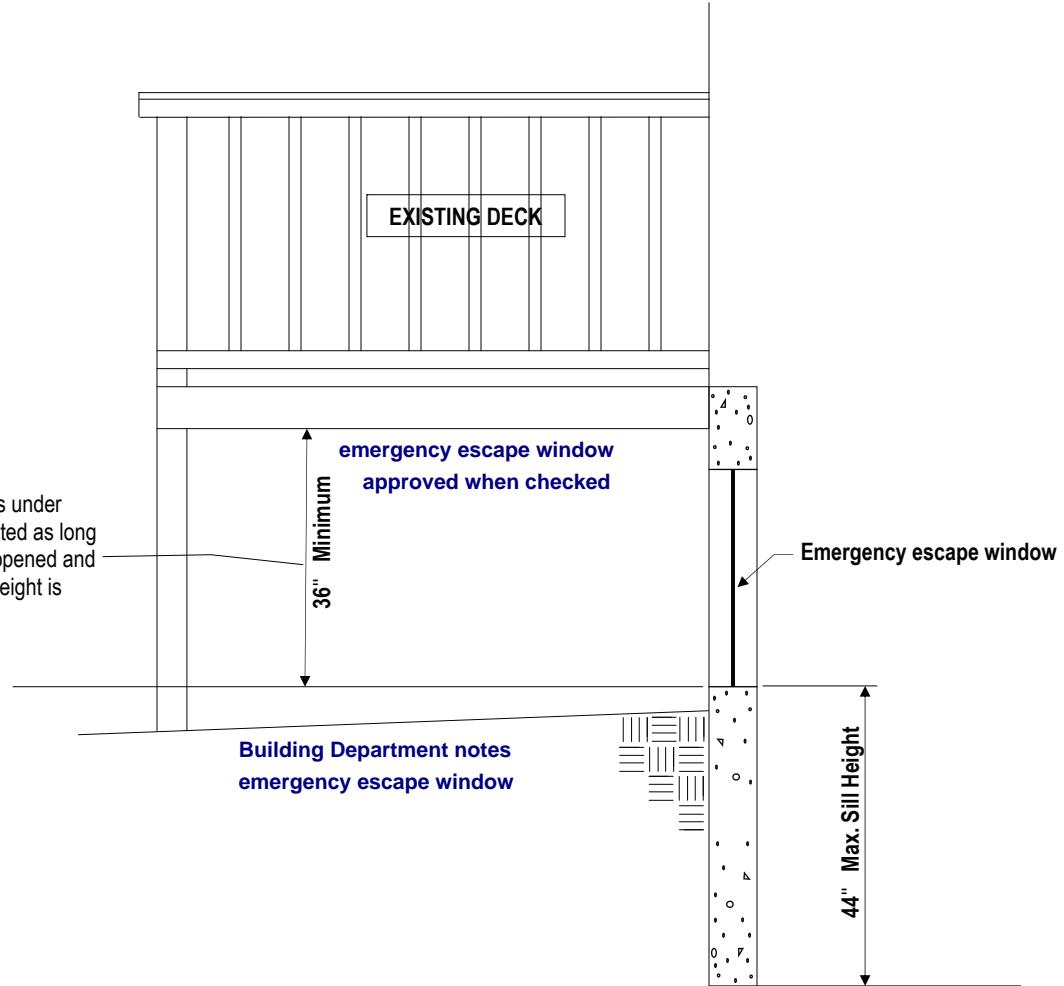
**Building Department notes  
means of egress**

Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge.



### EMERGENCY ESCAPE WINDOW WELL DETAIL

Emergency escape windows under decks or porches are permitted as long as the window can be fully opened and a path not less than 36" in height is provided to a court or yard.

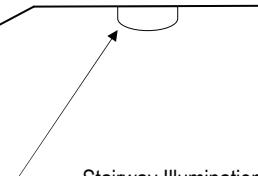


### EMERGENCY ESCAPE WINDOW UNDER EXISTING STRUCTURES

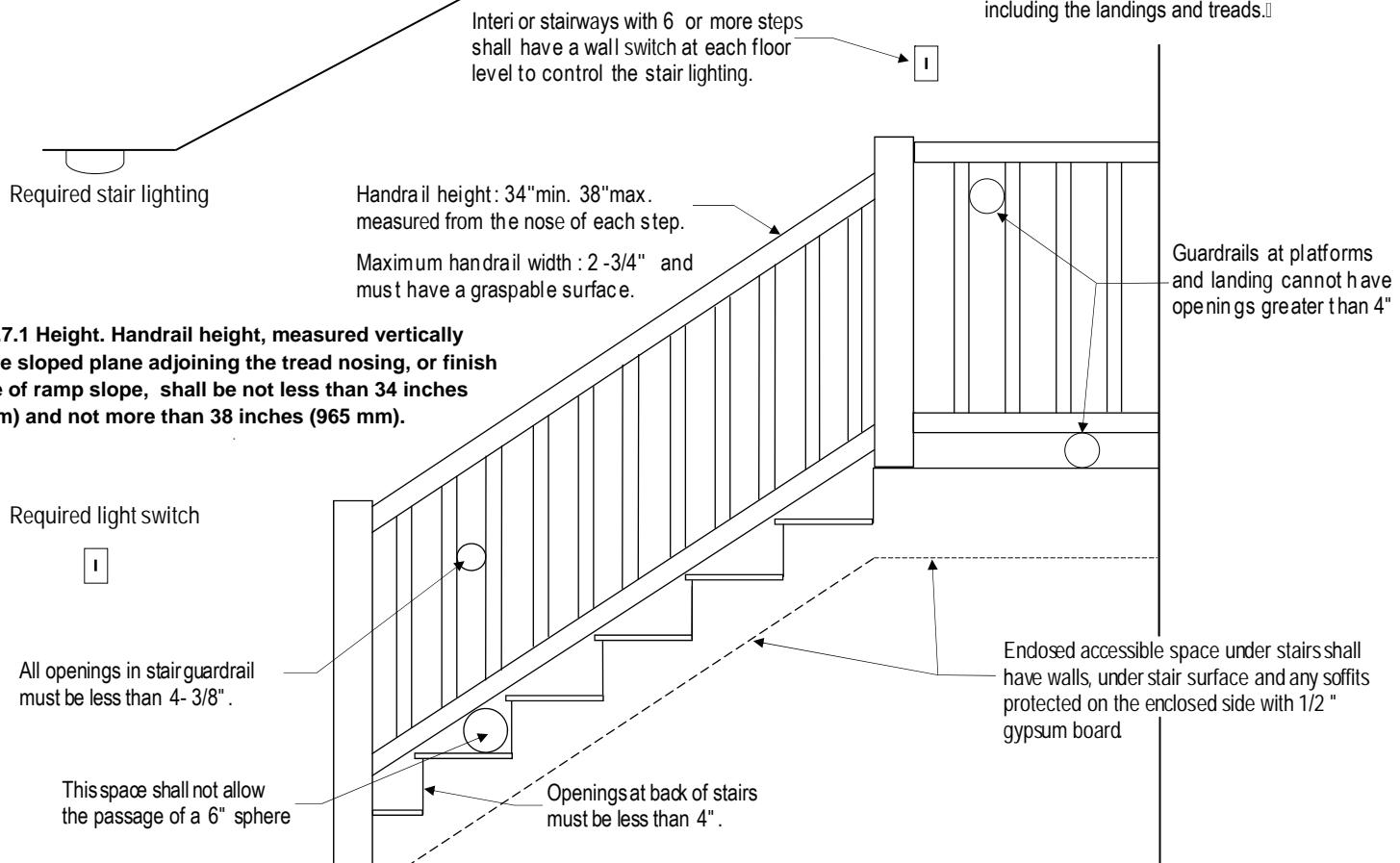
R311.7.2 Headroom. The minimum headroom in all parts of the stairway shall not be less than 6 feet 8 inches (2032 mm) measured vertically from the sloped line adjoining the tread nosing or from the floor surface of the landing or platform on that portion of the stairway.

#### building department notes on illumination

**illumination approved when checked**



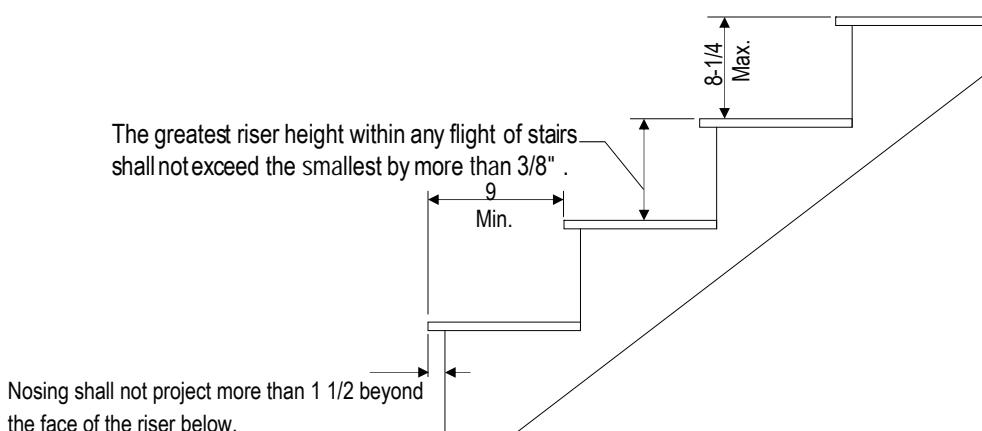
Stairway Illumination. All interior and exterior stairways shall be provided with an artificial light source to illuminate the stairs, including the landings and treads.



### INTERIOR STAIR DETAIL

**interior stair detail approved when checked**

notes on interior stairs



### TREAD AND RISER DETAIL

## CHECKLIST FOR APPLICATION

1.  Zoning Application Included
2.  Signed contract between homeowner and the registered home improvement contractor subject to MGL c 142A
3.  In lieu of submitting a signed contract as the owner of record, the owner shall submit  
Signed Affidavit for Home Improvement Contractor Required Contract Terms
4.  3 Sets of plans for the building or structure
5.  Mechanical Application (If applicable)
6.  ~~Site Plan prepared by Engineer or Registered Land Surveyor showing location of buildings or structure to lot lines also proposed location of new structures as per 780 CMR 110.10~~
7.  Sewer Department Approval or Approved Septic Plan
8.  Water District Approval Letter
9.  ~~Well Water Quantity & Quality Approval certificate from the Board of Health~~
10.  Smoke Detector Application From The Fire Department
11.  ~~Driveway Permit from The Highway Department (If applicable)~~
12.  Copies of Variances or Special Permits Granted by The Planning Board or Zoning Board of Appeals or any other Town Boards
13.  Worker's Compensation Certificate
14.  Insurance Binder from Insurance Company made out to the Town of Grafton
15.  Homeowner License Exemption (If applicable)
16.  Copy of Construction Supervisor License  
Type Description  
 U Unrestricted (up to 35,000 Cu. Ft.)  
 R Restricted 1&2 Family Dwelling  
 M Masonry Only  
 RC Residential Roofing Covering  
 WS Residential Window and Siding  
 SF Residential Solid Fuel Burning Appliance Installation  
 D Residential Demolition
17.  Copy of Home Improvement Registration (If applicable)
18.  Statement for disposal of debris (If applicable)
19.  Massachusetts Energy Compliance Report
20.  All monies due to the town must be paid (Certificate of Good Standing)
21.  Copies of Construction Control Forms
22.  Modular Homes: All of the above and see special requirements for Modular Home Written certification from the manufacturer for the person responsible for setting the units. Construction supervisor to obtain permit homeowner cannot obtain the building permit

Building Notes:

## Natural Light and Ventilation Worksheet

Space Designation	Floor Area Square Feet	Light (8% Required)	Light (Actual)	Ventilation (4% Required)	Ventilation (Actual)

### Natural and Mechanical Ventilation:

Each habitable room must be provided with natural ventilation through open screened window or door areas that total at least 4% of the floor area of the room. As an alternative, the code permits mechanical ventilation. Most major manufacturers of ventilation equipment offer balanced supply and exhaust fan units for this purpose. Simple exhaust fans are not permitted since the resulting negative house air pressure is a safety hazard and infiltration is insufficient. Another code permitted alternative is to provide outside air directly into the return air plenum of a forced air HVAC unit in the required amount of 15 CFM per bedroom plus 15 CFM. Mechanical ventilation equipment manufacturer's specifications must be provided. (AJ501.6)(2009 IRC, R303)

Equation below is how to convert square inches to square footage

1st Equation is for natural light (8%)

37 inches x 57 inches = 2,109 square inches / 144 = 14.65 square footage

2nd Equation is for natural ventilation (4%)

33.87 inches x 24.50 inches = 828.8 square inches / 144 = 5.76 square footage

This space has three windows one door with no screen.

Natural light would be each window 14.65 time three window equals 43.95 square feet

Natural ventilation would be each window 5.76 times three windows equals 17.28 square feet

### example of natural light and ventilation work sheet

Space Designation	Floor Area Square Feet	Light (8% Required)	Light (Actual)	Ventilation (4% Required)	Ventilation (Actual)
Basement Play Room	336	26.88	43.95	13.44	17.28

typical double hung



## SECTION R314 SMOKE ALARMS

**R314.1 Smoke detection and notification.** All smoke alarms shall be listed in accordance with UL 217 and installed in accordance with the provisions of this code and the household fire warning *equipment* provisions of NFPA 72.

**R314.2 Smoke detection systems.** Household fire alarm systems installed in accordance with NFPA 72 that include smoke alarms, or a combination of smoke detector and audible notification device installed as required by this section for smoke alarms, shall be permitted. The household fire alarm system shall provide the same level of smoke detection and alarm as required by this section for smoke alarms. Where a household fire warning system is installed using a combination of smoke detector and audible notification device(s), it shall become a permanent fixture of the occupancy and owned by the homeowner. The system shall be monitored by an *approved* supervising station and be maintained in accordance with NFPA 72.

**Exception:** Where smoke alarms are provided meeting the requirements of [Section R314.4.](#)

**R314.3 Location.** Smoke alarms shall be installed in the following locations:

1. In each sleeping room.
2. Outside each separate sleeping area in the immediate vicinity of the bedrooms.
3. On each additional *story* of the *dwelling*, including *basements* and habitable attics but not including crawl spaces and uninhabitable attics. In *dwellings* or *dwelling units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full *story* below the upper level.

When more than one smoke alarm is required to be installed within an individual *dwelling* unit the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual unit.

**R314.3.1 Alterations, repairs and additions.** When *alterations*, *repairs* or *additions* requiring a *permit* occur, or when one or more sleeping rooms are added or created in existing *dwellings*, the individual *dwelling unit* shall be equipped with smoke alarms located as required for new *dwellings*.

**R314.5 Heat Detector.** A single heat detector listed for the ambient environment shall be installed in:

1. Any integral garage ("garage under") or attached garage to the main house (detached garages do not require a heat detector).
2. A new addition attached garage to an existing dwelling. If the existing house contains a fire detection system that is compatible with the garage heat detector, then the detector shall be interconnected to the existing system. Where the existing fire detection system is not compatible with the garage heat detector, the garage heat detector shall be connected to a sounder (occupant notification appliance) or compatible heat detector containing a sounding device, located in the dwelling and within 20 feet (6096 mm) of the nearest door to the garage from the dwelling. The required garage heat detector is neither required to incorporate audible alarm notification nor is any audible notification device required in the garage.

**R314.5.1 Heat Detector Placement.** For flat-finished ceilings, the single heat detector shall be placed on or near the center of the garage ceiling. For sloped ceilings having a rise to run of greater than one foot in eight feet (305 mm in 2438 mm), the single heat detector shall be placed in the approximate center of the vaulted ceiling but no closer than four inches (102 mm) to any wall.

**R315.1 Governing Regulations.** Carbon monoxide alarms (alarms) for new construction and existing dwellings shall be furnished, installed and maintained by the owner in accordance with this section, M.G.L. c. 148, § 26F½ , 527 CMR 31.00: *Carbon Monoxide Alarms*, 248 CMR, NFPA 720 and the manufacturer's instructions.

**R315.2 Installation Locations.** One alarm shall be installed on each story of a dwelling unit, including basements and cellars (but not including crawl

spaces and uninhabitable attics). When mounting a carbon monoxide alarm on a story with a bedroom, the alarm, shall be located outside of bedrooms but no further than 10 feet of any bedroom door. If a combination smoke/carbon monoxide alarm is used, its location must comply with this section.

**R315.3 New Construction.** Alarms shall either be an interconnected 120V or part of a low voltage combination system or wireless system. Alarms shall have secondary (standby) power from monitored batteries in accordance with NFPA 72. For fire alarm control units (panels) and wireless systems, the panel battery shall serve as the source of secondary power. Alarms shall be UL 2034 or UL 2075 listed, as applicable. Alarms may be interconnected with fire alarms providing they are compatible and the fire alarms take precedence.

**R315.4 Existing Dwellings.** For existing dwellings, carbon monoxide alarms shall be provided in accordance with Section 315 for new construction, as applicable, for the following circumstances:

1. When one or more bedrooms are added or created in a dwelling unit, the entire dwelling shall be provided with alarms.
2. When a dwelling unit undergoes complete reconstruction such that all walls and ceilings are open to framing the entire dwelling unit shall be provided with alarms.
3. In an existing two-family dwelling, when one or more bedrooms are added or created in both of the two dwelling units, the entire building shall be provided with alarms.
4. In a townhouse building when one or more bedrooms are added or created in a dwelling then that dwelling unit shall be provided with carbon monoxide alarms.
5. In a townhouse building when a dwelling unit undergoes complete reconstruction such that all walls and ceilings are open to framing, that dwelling unit shall be provided with carbon monoxide alarms.